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HAZARDOUS WASTE PROGRAM
MISSOURI DEPARTMENT OF
NATURAL RESOURCES

**FINAL CLOSURE OF THE
INTERIM TSD FACILITY
LOCATED AT THE
MODINE HEAT TRANSFER, INC. SITE
CAMDENTON, MISSOURI
Prepared For
MODINE MANUFACTURING COMPANY**

**Dames & Moore Job No. 27397-005-045
December 20, 1996**



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HAZARDOUS WASTE PROGRAM
MISSOURI DEPARTMENT OF
NATURAL RESOURCES

Ed Sadler
Director
Hazardous Waste Program
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102-0176

Dear Mr. Sadler:

This letter is in response to the November 25, 1996 Missouri DNR request for a closure report with owner and P.E. certification for Modine Heat Transfer - Camdenton, identified as a requirement in 10 CSR 25-7.265(1). This submittal should satisfy all the previous and current closure requests and requirements for this site.

If you have any questions, please contact me at (414) 636-1649 or at the letterhead address.

Sincerely,

Thomas S. Sanicola
Environmental Engineer

Enclosure

cc: Modine Heat Transfer, Inc. - Camdenton
file(2)

Modine Manufacturing Company
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Racine, Wisconsin 53403

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1.0 INTRODUCTION

Modine Manufacturing Company (Modine) is submitting this report for the purpose of obtaining final closure of the Resource Conservation and Recovery Act (RCRA) regulated interim treatment, storage, or disposal (TSD) facility at the Modine Heat Transfer, Inc. site located in Camdenton, Missouri. The work conducted in the effort to obtain closure is documented in numerous work plans, reports and correspondence which are on file with the Missouri Department of Natural Resources (MDNR) and a matter of public record. Therefore, this closure report will only summarize the findings from these previous reports. The previously submitted free standing work products are listed in Appendix A.

1.1 Site Location and Operations

The Modine Heat Transfer, Inc. site is located on Sunset Drive in Camdenton, Missouri. The site occupies approximately 100 acres in Section 26, Township 38 North, Range 17 West in Camden County (Figure 1). The one manufacturing plant at the site occupies approximately 83,000 square feet and has undergone four construction additions through its history (1971, 1973, 1979, and 1983). Operations began at the site in 1967 under the ownership of Dawson Metal Products. Sundstrand Tubular Products (Sundstrand) purchased the site in 1974 and operated it until 1990. Modine Heat Transfer, Inc., a wholly owned subsidiary of Modine Manufacturing Company, purchased the site in October 1990. The site has always been utilized in the manufacture of aluminum and copper coils and feeder parts used in the manufacture of heat transfer products.

1.2 Site Setting

The site is located on an east to west trending small ridge top on the Salem Plateau, a subprovince of the Ozark Province. Ground surface at the site is mildly sloping to the south and west to steeply sloping to the south on the southern portion of the site. Topographic relief across the majority of the site is approximately 20 feet. Elevation at the plant is approximately 960 feet above mean sea level (msl).

1.2.1 Soil

The soil types encountered during this investigation include a red to brown clay with chert fragments and in some areas a grey clay with chert gravel in red clay. Though anticipated from literature, a distinct fragipan was not encountered in any of the soil borings. This residuum soil is reported to contain as much as 5 to 15 percent chert fragments.

1.2.2 Geology

The bedrock unit lying directly below the soil at the site is a cherty dolomite of the Ordovician age Roubidoux Formation. The Roubidoux Formation is generally 130 to 150 feet thick and consists of cherty dolomite, chert, and sandstone. The formation has entire layers of hard, brittle chert. In Camden County the Roubidoux has less sandstone than in counties further south. Beneath the Roubidoux is the Ordovician age Gasconade Dolomite 290 to 330 feet thick (which includes the 15 to 20 feet thick Gunter Sandstone Member at its base), the Cambrian age Eminence Dolomite 300 to 350 feet thick, and underlying the Eminence Dolomite are Precambrian granites and gneiss.

The results from previous investigations indicate that when drilling with a hollow stem auger, refusal was encountered at depths ranging from 4.5 feet to 13 feet below ground surface (bgs). Auger refusal is demonstrated to be well above the actual soil/rock interface which is present at approximately 32 feet to 55 feet below ground surface (bgs). We believe that refusal resulted from the encounter of chert nodules and/or remnant rock fragments.

1.2.3 Hydrogeology

No perched groundwater was encountered at the soil/rock interface during the advancement of the monitoring wells. Monitoring wells were completed at the first encounter of groundwater within the underlying bedrock. Monitoring wells at the site exhibited static water levels ranging from approximately 140 to 175 feet bgs and are completed to depths ranging from 158 to 197 feet bgs. The wells are completed in the base of the Roubidoux Formation or the top of the Gasconade Dolomite.

A literature search revealed that Hahatonka Springs located approximately 2.5 miles south of the Modine facility is situated near a northwest trending fault zone. Information indicates that springs in the Niangua river basin appear roughly along this fault line. As stated by Vineyard in *Springs of Missouri*, "These fault zones may represent preferred directions of jointing along which the principal solution channels are developed." He goes on to indicate that these main solution channels may connect with a set of smaller channels which would intersect at right angles with the main channel. Evidence of this channeling network is illustrated in the stream alignment in this area in which main streams tend to exhibit a northwest trend and smaller streams complete a crude rectangular network.

Potentiometric surfaces derived from groundwater level measurements taken during the quarterly monitoring events indicate a trough-like surface, which is lowest at the location of MW-1.

However, since fluid flow is primarily through secondary porosity (fractures) it is reasonable to assume that fracture directions will have a strong influence on the direction of groundwater flow.

2.0 REGULATORY AND INVESTIGATIVE HISTORY - RCRA TSDF CLOSURE

A RCRA Part A Permit application to operate a storage facility was submitted by the former owners of the facility (Sundstrand) to the U.S. Environmental Protection Agency (USEPA) in November, 1980. Revisions to the Part A permit were filed in 1983 and 1990. A RCRA Part B Permit application has not been filed; therefore, the facility has been operating as a treatment, storage, or disposal (TSD) facility under interim status. Prior to purchase of the Subject Property by Modine, Sundstrand submitted a Closure Plan in September, 1990 to terminate its interim status and hold generator status only. The Closure Plan addressed the former storage areas, located on the west side of the building (Figure 2). The three areas covered by the Closure Plan include:

- Area 1: 1980 - 1983 Drum Storage Area
- Area 2: 1983 - 1985 Tank and Drum Storage Area
- Area 3: 1985 - 1990 Tank and Drum Storage Area

The Closure Plan was revised by Modine in February of 1992 and was approved with modifications by the Missouri Department of Natural Resources (MDNR) in November, 1992. The contents of these modifications were negotiated and an agreement, including soil and mop/wipe sampling tasks was reached between Modine and MDNR. This work was performed in July, 1993. However, due to the detection of some constituents in the soil, clean closure was not obtained and final closure of the TSD facility was not granted by MDNR. An environmental risk assessment (risk assessment analysis of the soil) was conducted in August of 1994 to assess the potential impacts on human health from the soil. Following completion of the risk assessment, Modine was notified by MDNR that the assessment did not fulfill the closure requirements with regard to the groundwater issue. Therefore, a Work Plan for conducting a groundwater investigation was submitted to the MDNR on June 1, 1995. The groundwater investigation was performed in August of 1995 and included the installation of two monitoring wells in addition to the two installed by the MDNR in 1992. Quarterly sampling of the monitoring wells was begun at this time and continues to this date.

The findings of the August, 1995 site investigation and the November, 1995 quarterly sampling event were summarized in a draft report submitted to MDNR on January 5, 1996 and presented to the MDNR in a meeting on January 11, 1996. Based upon comments from that meeting, the report was revised and resubmitted in final form on February 12, 1996.

Results from the August, 1995 investigation indicated that a volatile organic compound (VOC) impact to soil exists along the storm water drain line. Efforts to assess the extent of the VOC impact to site soil were not completely successful. The off-set borings exhibited no field evidence of impact based upon PID readings; however, the soil samples contained low concentrations of VOCs. The MDNR agreed in the January 11, 1996 meeting, that TSDF could be closed with the remaining soil impact left in place if the following conditions were met:

- further evidence indicates that the soil is unlikely to be a continuing source related the observed groundwater impact at the site; and
- a deed notification is filed.

Therefore, a subsequent investigation was conducted to better assess the groundwater impact and a deed notification was filed with the Camden County Recorder of Deeds on September 23, 1996. This notarized document and associated survey plat were submitted to the MDNR via certified mail on October 8, 1996.

The groundwater samples collected during the August 1995 investigation and subsequent quarterly monitoring events indicated elevated TCE concentrations only in monitoring well MW-4. Results from each quarterly monitoring event are summarized in a letter submitted to the MDNR within four weeks of each event. Based upon the potentiometric surfaces derived from groundwater level measurements, a trough-like surface exists beneath the site. The trough is lowest at the location of MW-1, which would suggest that groundwater originating beneath the Subject Property should move through MW-1. The fact that TCE concentrations were higher in MW-4 relative to MW-1 is not consistent with the potentiometric surface indicated by measured water depths. However, since fluid flow is primarily through secondary porosity (fractures) it is reasonable to assume that fracture directions will have a strong influence on the direction of groundwater flow. Therefore, a Work Plan dated April 26, 1996 was submitted to the MDNR for an investigation of the fracture system in the dolomite underlying the site. The primary purpose of this investigation was to resolve the inconsistencies between subsurface water chemistry and apparent directions of groundwater flow.

The results of the fracture system investigation were summarized in a report to the MDNR dated July 17, 1996 and presented to the MDNR in a meeting on July 26, 1996. A brief summary of the findings is as follows:

- The vast majority of all of the fractures are vertical or nearly vertical. Only 5 of the 173 fractures surveyed were oriented at less than 75° from horizontal. Only one fracture was oriented at less than 45° from horizontal.

- The strongly preferred fracture orientation apparent from the data set is an overall trend of N 50° E or northeast - southwest.
- None of the fracture or bedding-involved fluid flow mechanisms are consistent with impact of groundwater at MW-4, from an on-site source.
- The preferred fracture direction trends directly toward a former city owned and operated lagoon located northeast of the Subject Property. If the lagoon has acted as a receptor for TCE in the past, the possibility exists that TCE is migrating onto the Modine facility through the vertical fractures located within the subsurface.

Based upon the results of the field fracture survey, the former lagoon located approximately 1,000 feet northeast of the Modine Heat Transfer facility appeared to be the source of the observed trichloroethene (TCE) impact to groundwater. Modine initiated an investigation to determine the presence or absence of volatile organic compounds (VOCs), in particular TCE, in soil underlying the former lagoon. The former lagoon was known as the Hulett Lagoon and was owned and operated by the City of Camdenton as a Publicly Owned Treatment Works (POTW). The investigation was conducted on October 11, 1996 and the results reported to the MDNR in a letter report dated October 30, 1996. Soil from beneath the lagoon exhibited significant TCE concentrations. Therefore, it appears that the former lagoon is the source for the TCE impact to groundwater observed at the Modine facility.


3.0 CONCLUSIONS

Modine believes they have adequately fulfilled the requirements for closure of the TSDF at the Modine Heat Transfer facility in Camdenton, Missouri as outlined in the MDNR approved Closure Plan and modifications. The required "Notice of Hazardous Waste Activity" has been recorded with the Recorder of Deeds for the County of Camden, State of Missouri identifying the area of concern and concentrations remaining in the on-site soils. It has been successfully demonstrated that an on-site source, such as the TSDF, could not be the cause of the groundwater impact observed in monitoring well MW-4 based upon fracture orientation and related movement through the fracture zone. An off-site source, a former surface lagoon, was identified northeast of the facility. Soil samples collected from beneath the base of lagoon indicted a significant TCE impact to subsurface soil. The location of the lagoon is on a direct line from monitoring well MW-4 in the strongly preferred direction of fracture orientation.

4.0 CERTIFICATION

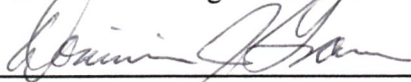
In accordance with the provisions of 40 CFR 264, I hereby certify that the TSDF at the Modine Heat Transfer, Inc. Site in Camdenton, Missouri has been closed in accordance with the MDNR approved closure plan.

Thomas S. Sanicola
Printed Name of Owner/Operator


Signature of Owner/Operator

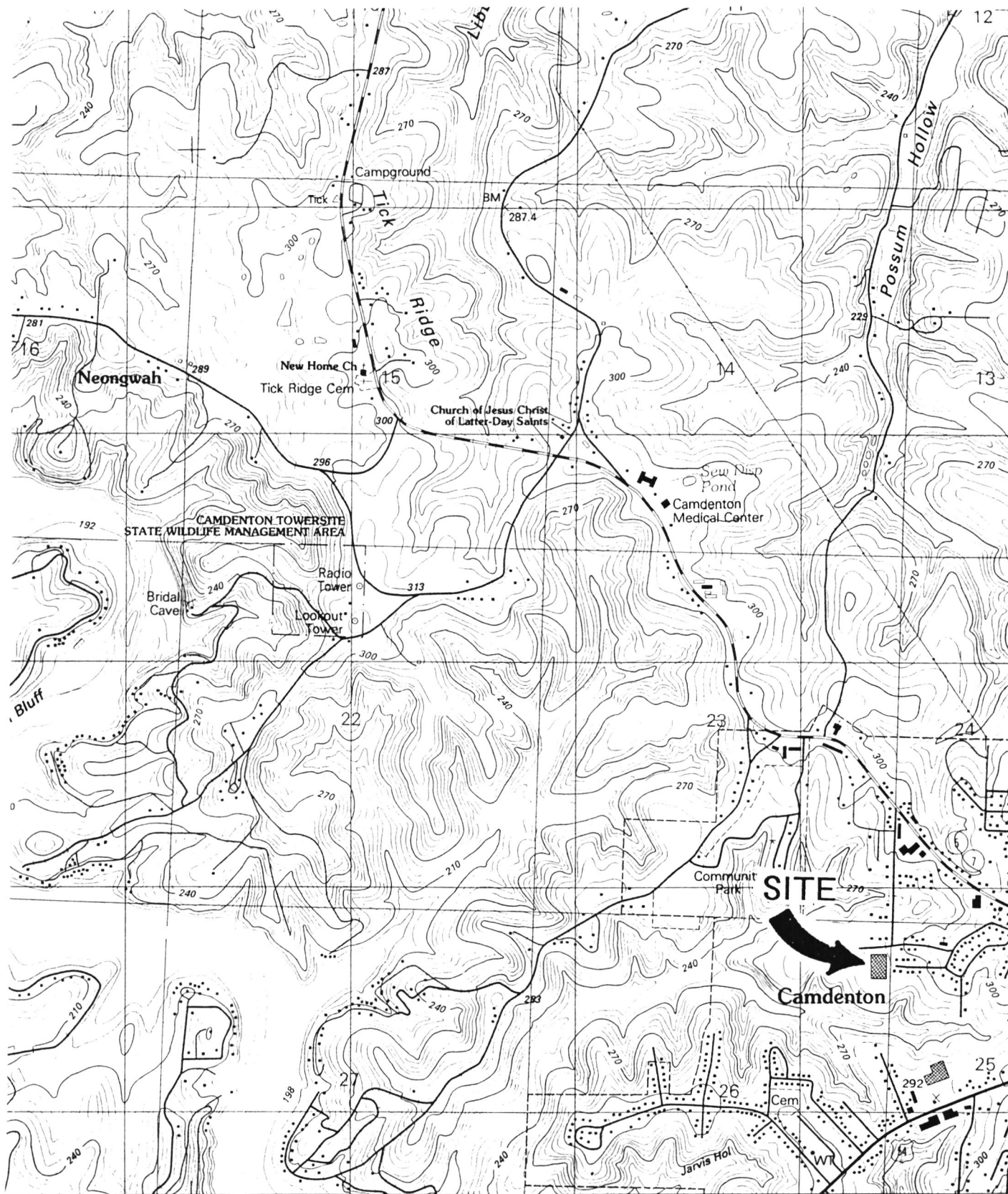
12/23/96
Date

Dominic J. Grana, P.E.
Printed Name of Registered Professional Engineer


Signature of Registered Professional Engineer

E17734
Missouri Registration No.

12/20/96
Date



GREEN BAY TERRACE, MISSOURI

Adapted from United States Geological Survey
7.5 Minute Quadrangle (Topographic)
1983

Scale in Feet



Figure 1 SITE LOCATION MAP

Modine Heat Transfer, Inc.
Camdenton, Missouri

Scale 1:24,000

DAMES & MOORE, INC.

APPENDIX A

- Dames & Moore, 1995, *Work Plan Modification for an Investigation to Achieve Final Closure of the Interim TSD Facility, prepared for Modine Manufacturing Company*. Revised June 1, 1995.
- Dames & Moore, 1996, *Findings of an Investigation to Achieve Final Closure of the Interim TSD Facility Located at the Modine Heat Transfer, Inc. Site, Camdenton, Missouri*. February 12, 1996.
- Dames & Moore, 1996, *Work Plan for an Investigation of the Fracture System in the Dolomite Underlying the Modine Heat Transfer, Inc. Site, Camdenton, Missouri*. April 26, 1996
- Dames & Moore, 1996, *Final Report of Fracture System Investigation, Modine Heat Transfer, Inc., Camdenton, Missouri*. July 17, 1996
- Dames & Moore, 1996, *Letter Report, Subsurface Investigation, Former Hulett Lagoon, Camdenton, Missouri*. Submitted to Ms. Darleen Westcott Environmental Engineer Missouri Department of Natural Resources. October 30, 1996.
- Law Engineering and Environmental Services. 1991. *Environmental Site Assessment, Modine Heat Transfer, Inc.* Consulting report prepared for Modine Manufacturing Company November 1991.
- Law Engineering and Environmental Services. 1993. *Additional Environmental Assessment Services, Modine Heat Transfer, Inc.* Proposal prepared for Modine Manufacturing Company April 9, 1993.
- Law Engineering and Environmental Services. 1993. *Revised Environmental Site Assessment, Modine Heat Transfer, Inc.* Consulting report prepared for Modine Manufacturing Company August 1993.
- Law Engineering and Environmental Services. 1994. *Environmental Risk Assessment of Former Drum Storage Areas, Modine Heat Transfer, Inc.* Consulting report prepared for Modine Manufacturing Company August 16, 1994.
- Law Engineering and Environmental Services. 1995. *Report of Groundwater Sampling Event, Modine-Camdenton, Missouri Facility*. Consulting report submitted to Modine Manufacturing Company March 28, 1995.
- Sanicola, T.S./Modine Manufacturing Company. Certified Letter dated October 8, 1996, to Ms. Darleen Westcott/Missouri Department of Natural Resources Hazardous Waste Program transmitting the notarized deed notification and associated survey plat.